

What Is Claimed Is:

1 1. A method for using empirical measurements of accesses to
2 synchronization points within an application to construct a performance model for
3 the application, comprising:
4 modifying the application to record statistics related to the synchronization
5 points within the application;
6 running the application to produce the statistics related to synchronization
7 points;
8 constructing the performance model based upon the statistics; and
9 using the performance model to predict a performance of the application.

1 2. The method of claim 1,
2 wherein constructing the performance model based upon the statistics
3 involves constructing an analytic model for the application; and
4 wherein using the performance model to predict the performance involves
5 numerically solving the analytic model to predict the performance for the
6 application.

1 3. The method of claim 1,
2 wherein constructing the performance model based upon the statistics
3 involves constructing a simulation model for the application; and
4 wherein using the performance model to predict the performance involves
5 running the simulation model to predict the performance for the application.

1 4. The method of claim 1, wherein modifying the application involves
2 compiling the application with a profiling option in order to record the statistics
3 related to the synchronization points.

1 5. The method of claim 1, wherein modifying the application involves
2 modifying the executable code of the application to record the statistics during
3 system calls that operate on the synchronization points.

1 6. The method of claim 1, wherein the statistics include:
2 an identifier for a calling function;
3 an identifier for a mutual exclusion variable;
4 a time spent holding the mutual exclusion variable; and
5 a frequency of accesses to the mutual exclusion variable.

1 7. The method of claim 1, wherein the statistics include a directed
2 call graph specifying an ordering of function calls.

1 8. The method of claim 7, wherein constructing the performance
2 model involves constructing a queuing model, wherein each synchronization point
3 is a service center for jobs representing processes that circulate between service
4 centers in a manner specified by the directed call graph.

1 9. A computer-readable storage medium storing instructions that
2 when executed by a computer cause the computer to perform a method for using
3 empirical measurements of accesses to synchronization points within an
4 application to construct a performance model for the application, the method
5 comprising:

6 modifying the application to record statistics related to the synchronization
7 points within the application;
8 running the application to produce the statistics related to synchronization
9 points;
10 constructing the performance model based upon the statistics; and
11 using the performance model to predict a performance of the application.

1 10. The computer-readable storage medium of claim 9,
2 wherein constructing the performance model based upon the statistics
3 involves constructing an analytic model for the application; and
4 wherein using the performance model to predict the performance involves
5 numerically solving the analytic model to predict the performance for the
6 application.

1 11. The computer-readable storage medium of claim 9,
2 wherein constructing the performance model based upon the statistics
3 involves constructing a simulation model for the application; and
4 wherein using the performance model to predict the performance involves
5 running the simulation model to predict the performance for the application.

1 12. The computer-readable storage medium of claim 9, wherein
2 modifying the application involves compiling the application with a profiling
3 option in order to record the statistics related to the synchronization points.

1 13. The computer-readable storage medium of claim 9, wherein
2 modifying the application involves modifying the executable code of the

3 application to record the statistics during system calls that operate on the
4 synchronization points.

1 14. The computer-readable storage medium of claim 9, wherein the
2 statistics include:

3 an identifier for a calling function;
4 an identifier for a mutual exclusion variable;
5 a time spent holding the mutual exclusion variable; and
6 a frequency of accesses to the mutual exclusion variable.

1 15. The computer-readable storage medium of claim 9, wherein the
2 statistics include a directed call graph specifying an ordering of function calls.

1 16. The computer-readable storage medium of claim 15, wherein
2 constructing the performance model involves constructing a queuing model,
3 wherein each synchronization point is a service center for jobs representing
4 processes that circulate between service centers in a manner specified by the
5 directed call graph.

1 17. An apparatus for using empirical measurements of accesses to
2 synchronization points within an application to construct a performance model for
3 the application, comprising:

4 a modification mechanism that is configured to modify the application to
5 record statistics related to the synchronization points within the application;
6 an execution mechanism that is configured to run the application to
7 produce the statistics related to synchronization points;

8 a performance model construction mechanism that is configured to
9 construct the performance model based upon the statistics; and
10 a performance predicting mechanism that is configured to use the
11 performance model to predict a performance of the application.

1 18. The apparatus of claim 17,
2 wherein the performance model construction mechanism is configured to
3 construct an analytic model for the application; and
4 wherein the performance predicting mechanism is configured to predict
5 the performance of the application by numerically solving the analytic model.

1 19. The apparatus of claim 17,
2 wherein the performance model construction mechanism is configured to
3 construct a simulation model for the application; and
4 wherein the performance predicting mechanism is configured to predict
5 the performance of the application by running the simulation model.

1 20. The apparatus of claim 17, wherein the modification mechanism is
2 configured to compile the application with a profiling option in order to record the
3 statistics related to the synchronization points.

1 21. The apparatus of claim 17, wherein the modification mechanism is
2 configured to modify the executable code of the application to record the statistics
3 during system calls that operate on the synchronization points.

1 22. The apparatus of claim 17, wherein the statistics include:
2 an identifier for a calling function;

1 an identifier for a mutual exclusion variable;
2 a time spent holding the mutual exclusion variable; and
3 a frequency of accesses to the mutual exclusion variable.

1 23. The apparatus of claim 17, wherein the statistics include a directed
2 call graph specifying an ordering of function calls.

1 24. The apparatus of claim 23, wherein the performance model
2 construction mechanism is configured to construct a queuing model, wherein each
3 synchronization point is a service center for jobs representing processes that
4 circulate between service centers in a manner specified by the directed call graph.
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